BC 5804434

Instruction Manual

JANUARY 1974

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MODEL 1715

Digital Comparator

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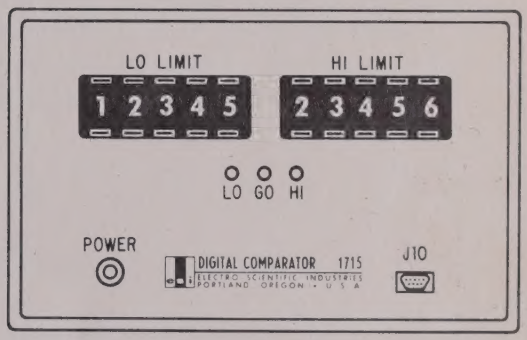

MP MASTER
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TABLE OF CONTENTS

1. DESCRIPTION
   - 1.1 INTRODUCTION 1-1
   - 1.2 CIRCUITRY DESCRIPTION 1-1
   - 1.3 SPECIFICATIONS 1-2

2. OPERATION 2-1

3. PARTS LIST AND SCHEMATIC DIAGRAMS 3-1

SECTION 1

DESCRIPTION

1.1 INTRODUCTION

The Model 1715 Digital Comparator is designed as a companion unit to the Model 1700 Digital Converter to give rapid go-no-go outputs, which can be used to sort or trim resistors. The Model 1715 compares the output of the 1700 Digital Converter with two limits, manually selected on two five-digit pushbutton assemblies. The result is displayed as LO, GO or HI on light emitting diodes (LED's), and also appears as DTL outputs and relay contact closures for the three limits. When the Model 1716 Test Fixture is used, LED's on this fixture also display the result.

1.2 CIRCUIT DESCRIPTION

The digital comparator is assembled on one printed circuit board. This board contains a +5 V logic power supply with thermal and current overload protection. It also contains ten digital comparators; five comparators for each limit which compare the converter outputs with the switch settings. The outputs from the comparators are logically decoded for each band to drive relays providing contact closures, LED indicators on the front panel and Model 1716 fixture (if used), and provide open-collector DTL logic outputs (high = true = +5 V).

LO is defined as a reading less than the LO limit.

HI is defined as a reading greater than the HI limit.

GO is defined as equal to or greater than the LO limit and equal to or less than the HI limit.

The BCD pushbutton switches are wired to the printed circuit board. All wiring and assembly is done on an inner chassis that can be removed easily for trouble-shooting any portion of the digital comparator.

1.3 SPECIFICATIONS

Bands: Three. LO $<$ LO limit setting
HI $>$ HI limit setting
LO limit $\leq$ GO $\leq$ HI limit

Limits: Two, manually selected using 5-digit pushbutton assemblies

Limit Range: 00000 to 19999

Accuracy: No error contributed (accuracy equal to Model 1700 with plug-in)

Input/Output: 50-pin connector on rear of unit (BCD inputs, logic outputs, relay contacts). BCD inputs are + true or - true, set by jumpers on the circuit board (see Figure 3-1).

9-pin connector on front of unit (indicator drive signal for Model 1716 test fixture if used).

Input Logic Levels: TTL logic levels (0 V = true, +5 V = false)

Optional: 5 V = true, 0 V = false

Outputs: a) HI, GO and LO LED indicators on the front panel, and an optional Model 1716 Test Fixture if used.

b) Open-collector DTL logic to rear-panel connector J9.

c) Relay contact closures for each limit at rear-panel connector J9. Contacts are rated 250 mA maximum, 100 V DC maximum, not to exceed 10 W (non-inductive). Refer to Table 2-1.

Power: 115 V or 230 V ±15%, 50-60 Hz.

SECTION 2

OPERATION

Connect the Model 1715 Digital Comparator to the Model 1700 rear-panel connector with the cable provided. If the optional Model 1716 Test Fixture is used, plug in its appropriate cable to the Model 1715 front-panel connector.

Set the Model 1715 switches as follows:

Power - ON (button illuminated)

LO Limit - Set minimum acceptable value on LO Limit pushbutton switches

HI Limit - Set maximum acceptable value on HI Limit pushbutton switches

When the converter changes the display, the comparator will compare the result with the limits, display the results on the LED indicators, close the proper limit relay, and activate the proper limit output gate within 1 μs excluding the operating time for the limit relays. The operating time for the relays will affect only the circuitry connected to the relay contacts.

Table 2-1. Remote Input/Output Connector Pin Assignments

PINS		FUNCTION*
1	$\overline{C2}$*	Digit 2, BCD bit 4, 0 = true
2	$\overline{B2}$*	Digit 2, BCD bit 2, 0 = true
5 thru 16	0 volts	Logic return
17	HI	HI limit, 1 = true (output)
18	LO	LO limit, 1 = true (output)
19	GO	GO limit, 1 = true (output)
20,21	GO contacts	GO limit relay contacts (closed = GO) (output)
22,23	LO contacts	LO limit relay contacts (closed = LO) (output)
24,25	HI contacts	HI limit relay contacts (closed = HI) (output)
26,31,38,43,48	+5 volts	+5 V (logic)
27	$\overline{D2}$*	Digit 2, BCD bit 8, 0 = true
28	$\overline{A2}$*	Digit 2, BCD bit, 1, 0 = true
30	$\overline{+}$*	Digit 5, + sign, 0 = +
32	$\overline{A5}$*	Digit 5, BCD bit 1, 0 = true
34	$\overline{OL}$*	Digit 5, overload bit, 0 = overload ($\overline{OL}$)
35	$\overline{B4}$*	Digit 4, BCD bit 2, 0 = true
36	$\overline{A4}$*	Digit 4, BCD bit 1, 0 = true
39	$\overline{C4}$*	Digit 4, BCD bit 4, 0 = true
40	$\overline{D4}$*	Digit 4, BCD bit 8, 0 = true
41	$\overline{B3}$*	Digit 3, BCD bit 2, 0 = true
42	$\overline{A3}$*	Digit 3, BCD bit 1, 0 = true
44	$\overline{C3}$*	Digit 3, BCD bit 4, 0 = true
45	$\overline{D3}$*	Digit 3, BCD bit 8, 0 = true
46	$\overline{B1}$*	Digit 1, BCD bit 2, 0 = true
47	$\overline{C1}$*	Digit 1, BCD bit 4, 0 = true
49	$\overline{D1}$*	Digit 1, BCD bit 8, 0 = true
50	$\overline{A1}$*	Digit 1, BCD bit 1, 0 = true
J10		
3	0 volts	GRD (logic return) (output)
6	+5 V	Logic +5 V (output)
7	$\overline{HI}$	HI limit, 0 = true (output)
8	$\overline{GO}$	GO limit, 0 = true (output)
9	$\overline{LO}$	LO limit, 0 = true (output)

NOTES: All pins are inputs unless otherwise noted.

High = 1 = +5 V Low = 0 = 0 V

Digit	5 4 3 2 1
Reading	1x9x9x9 9

*If BCD non-inverting logic option is selected, 1 = true on these inputs.

SECTION 3

PARTS LIST AND SCHEMATIC DIAGRAM

CIRCUIT NO.	DESCRIPTION	ESI PART NO.
DS1, 2, 3	Led, Opcoa, OSL-3L	336-26021
F1	Fuse, 1/4 A Slo-Blo	333-01812
FL1	Filter, Line	504-20282
J10	Connector, 9 Pin	504-20506
R9	Resistor, 220 Ω, 1/4 W, 10%	307-13911
R10	Resistor, 100 kΩ, 1/4 W, 10%	307-13945
S1, S2	Switch, Push-Wheel, 5 Pole, Binary	330-27845
S3	Switch, Push-Button, On-Off	336-18418
S4	Switch, 115 V - 230 V	330-18424
U16	IC, 7805, 5 V Regulator	343-20699
	Bezel, Aluminum	710-26031
	Cable Assembly, Interconnecting	520-27769
	Clip, LED Mounting	329-18628
	Cord, Power	520-13178
	Foot, Rubber	436-08715
	Fuseholder	334-03074
	Panel, Bottom	711-26033
	Panel, Front	436-27288
	Panel, Rear	436-27292
	Panel, Side, Extrusion	711-26030
	Panel, Top	711-26032
	Rail, Mounting	721-27765
	Circuit Assembly, Digital Comparator consisting of:	505-27771
C1	Capacitor, 4000 μF, 25 V	314-26082
C2	Capacitor, 200 μF, 15 V	314-15838
C3, C4, C5*	Capacitor, 0.01 μF, Disc	311-12144
CR1	Full Wave Bridge, KBP-02	321-21236
J9	Connector, 50 Pin	504-25140
	Block, Connector Mounting	710-27766
K1, K2, K3	Relay, 14 Pin DIP	332-27841
R1 thru R4	Resistor, 1 kΩ, 1/4 W, 10%	307-13920
R5 thru R8	Resistor, 470 Ω, 1/4 W, 10%	307-13915
T1	Transformer, Power	340-23130
U1, U2	IC, MC858	343-20627
U3	IC, 1 kΩ Resistors	343-20700
U4, U5	IC, 470 Ω Resistors	343-20795
U6 thru U15	IC, 7485	343-20698
	Printed Circuit Board, Digital Comparator	505-27770

*C3, C4 and C5 are power supply decoupling capacitors and are not shown on the schematic diagram.

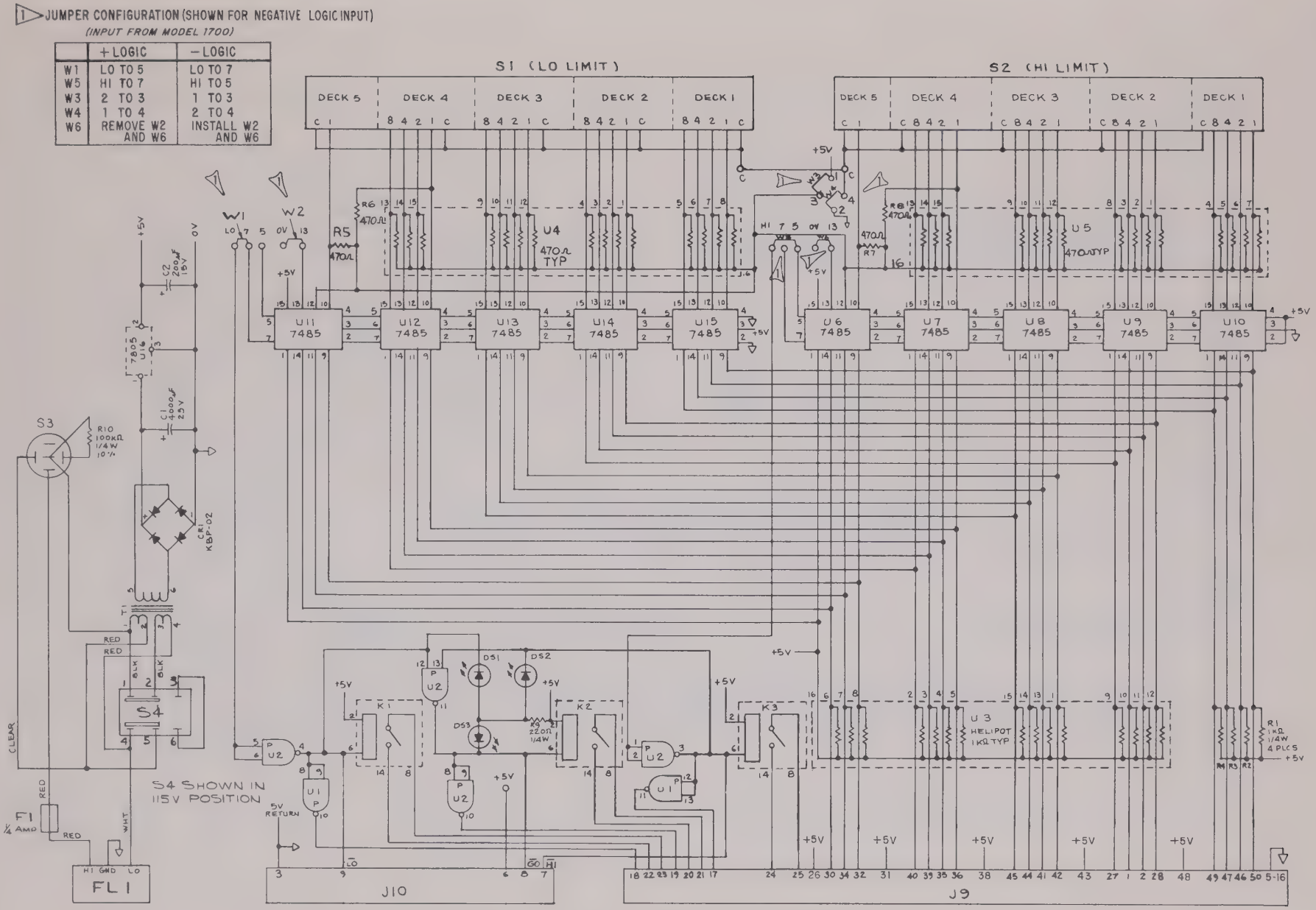

Figure 3-1. Model 1715 Schematic Diagram

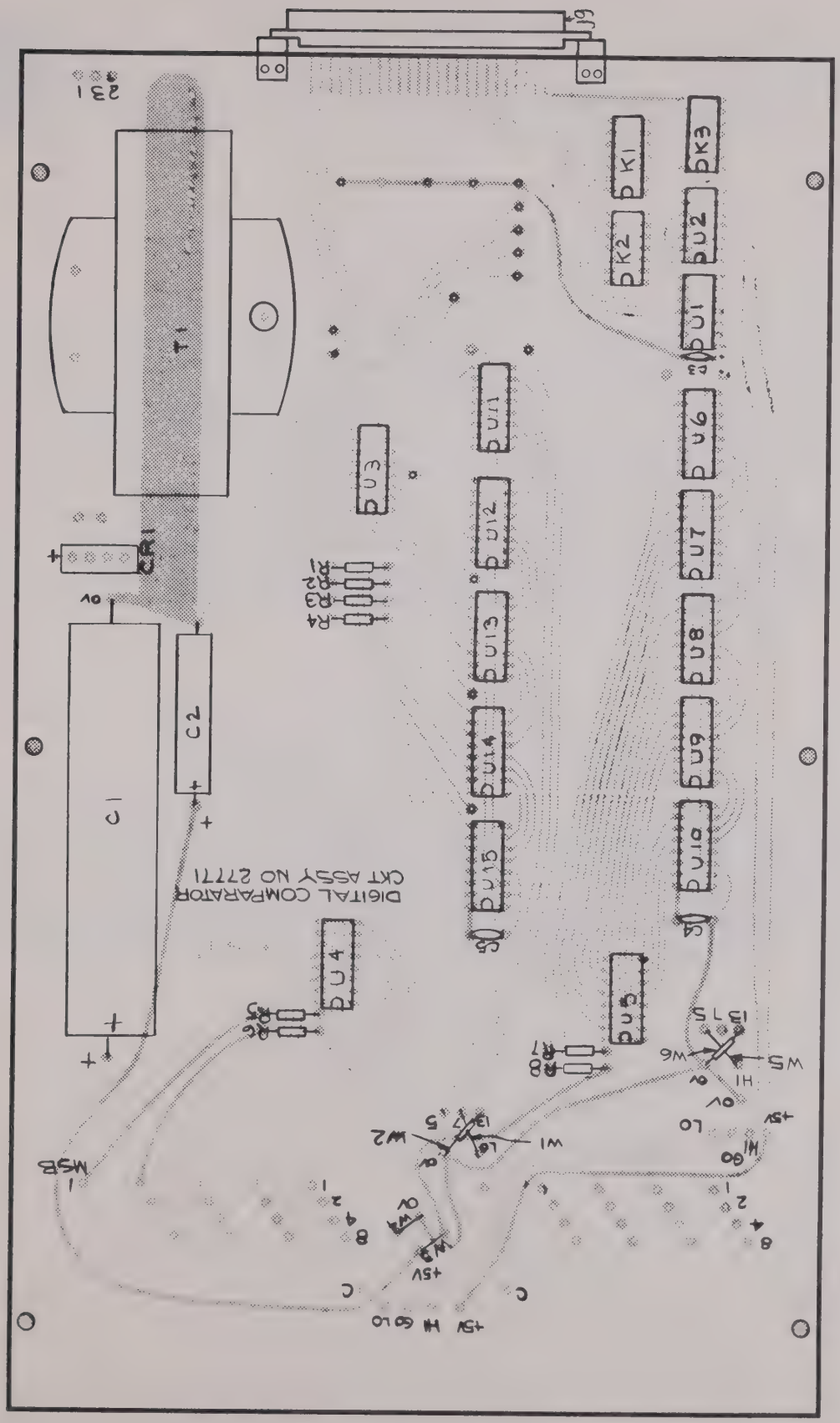

Figure 3-2. Model 1715 Circuit Board Components Locations

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☐ EB15 Low Input Resistance Voltage Dividers, *February 1970*

☐ EB17 Accuracy vs. Frequency of Models 290B and 250DE Universal Impedance Bridges, *(revised May 1969)*

☐ EB26 International System of Units, *August 1969*

☐ EB29 DC and Low Frequency AC Ratio Measurements, *Dr. Merle L. Morgan, September 1962*

☐ EB30 Traceability of Resistance Measurement, *Jack Riley, January 1964*

☐ EB34 Resistance Transfer Technique, *Lawrence H. White, (revised April 1968)*

☐ EB35 An Improved Technique for Establishing Resistance Ratios, *R. M. Pailthorp and J. C. Riley, November 1962*

☐ EB41 Derivation of Electrical Units from Fundamental Standards, *R. D. Kuykendall and R. M. Pailthorp, July 1964*

☐ EB44 DC measurements Using Ratio Techniques, *Jack C. Riley, September 1965*

☐ TA2 A Ratio Transformer Bridge for Standardization of Inductors and Capacitors, *D. L. Hillhouse and H. W. Kline, August 1960*

☐ TA6 The Accuracy of Series and Parallel Connections of Four-Terminal Resistors, *Jack C. Riley, April 1965*

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☐ TA14 The Advantages of a Ten Kilohm Transportable Resistance Standard, *Robert M. Pailthorp, Septen ber 1967*

☐ TA16 Which Bridge for Precise Resistance Measurements? *Edward J. Swenson and George D. Vincent, December 1967*

☐ TA17 Experimental Verification of the Five-Terminal, Ten-Kilohm Resistor as a Device for Dissemination of the Ohm, *R. M. Pailthorp and George Vincent, December 1968*

☐ TA22A Laser Resistance Trimming from the Measurement Point of View, *Arthur G. Albin and Edward J. Swenson, June 1971*

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☐ TA25 Laser Trimming Analysis Using a Resistive Sheet Analogy, *Swenson, Vincent, Riley, December 1972*

☐ TA26 The Effects of Laser Trimming on Birox and 1100 Series Thick Film Composition, *N. S. Spann, R. Headley, G. D. Vincent and E. J. Swenson, October 1971*

☐ TA27 Laser Trimming Thin Film Precision Resistor Networks with an Automated System, *Leonhard Groth, January 1974*

☐ TA28 YAG Laser Trimming of Thick Film Resistors, *Headley, Popowich, Anders, January 1974*

☐ TA31 A Method of Obtaining Optimum Trimming Performance from a Laser System, *Paul F. Parks and Thomas W. Richardson, October 1974*

☐ TA32 Laser Trimming RC Active Filters, *Edward J. Swenson, April 1978*

☐ TA33 Reducing Post Trim Drift of Thin Film Resistors By Optimizing YAG Laser Output Characteristics, *June 1978*

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